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Analysis of Need for Fast Vessels in Ferries

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Abstract

Transportation needs in an area are caused by the interaction between socio-political activities and tourism in the area. Transportation plays a very important role in the success of the development of an area, which has a role as a link between one area and another which is separated by the presence of water, the role of transportation is also very closely related to development, and stimulates new developments activities in the development of the transportation system play a very important and very useful role in the smooth development of the wheels, strengthening unity and integrity that affects all aspects of life. With the increase in travel caused by population growth and the increase in the standard of living of the community, further infrastructure and facilities and other supporting facilities are needed so that the implementation of ferries transportation can be carried out safely, safely, quickly, smoothly, orderly, regularly, comfortably and efficiently. To serve fast, safe, comfortable and inexpensive services, fast boat transportation that serves the Lembar-Padangbai line is needed. Meanwhile, fast boat companies are currently prohibited from operating again due to facilities that are not suitable for operation. On the basis of these considerations, it is necessary to have a fast ship serving the Lembar-Padangbai route.

Keywords: Fast Boats; Ferries; Transportation.

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1. Introduction

The situation in the West Lombok Regency which is adjacent to the island of Bali which is separated by the Lombok Strait, this causes ferry transportation to be the main transportation for goods or passengers that can be reached by the community in supporting equitable development. Ferry Transportation has an important role to provide support for economic growth, especially ferries. The position of transportation is one of the determining elements in ensuring the economic development of the community. As the economy grows, the role of transportation becomes more important. This is because the economy's dependence on transportation becomes greater because it must always be guaranteed the smooth flow of goods and passengers quickly, cheaply and safely from Padangbai Port to Lembar Port or vice versa.

Act No. 17 In 2008 concerning Shipping, it states that shipping is a unitary system consisting of transportation in the waters, ports, safety and security, as well as protection of the maritime environment (Act No. 17 of 2008 concerning Shipping). The Lembar Ferry Port is one of the Ferry Ports in West Lombok Regency which serves the Lembar-Padangbai. At the Lembar Ferries Port, there is a ferries transportation company operated by PT. Indonesia Ferry ASDP Lembar Branch.

With the increase in travel due to population growth and the increase in the standard of living of the community, further infrastructure and facilities and other supporting facilities are needed so that the implementation of ferry transportation can be carried out safely, safely, quickly, smoothly, orderly, regularly, comfortably and efficiently. (Salim, Abbas. with his book Transportation Management) To serve fast, safe, comfortable and inexpensive services, fast boat transportation that serves the Lembar-Padangbai line is needed. Meanwhile, fast boat companies are currently prohibited from operating again due to facilities that are not suitable for operation. On the basis of these considerations, it is necessary to have a fast ship serving the Lembar-Padangbai route.

2. Research Methods

Results of descriptive analysis of respondent characteristics based on the number of ferry service users from the Lembar Ferries Port, which was 95,121 passengers, and from the Padangbai Ferry Port, which was 93,178 passengers, the sample size for this study was 312 respondents. As for the characteristics of these service users, the writer uses descriptive analysis which includes an analysis of:

Simple Scheduling of Fast Boat Cross of Lembar-Padangbai in 2018 Sailing is said to be regular if it is carried out based on a schedule, thus the time of departure and arrival of the Fast Ship must be known with certainty, therefore in this scheduling analysis, namely analyzing and arranging the departure and arrival times of each ship serving the Lembar-Padangbai. With the Fast Ship Headway the plan is 180 minutes, based on this analysis the preparation of the schedule can consider the operational time of the Fast Ship. The preparation of departure and arrival schedules at the Lembar-Padangbai is as follows:

Based on the analysis results known:

RTT: 6 hours = 360 minutes

Headway: 3 hours = 180 minutes

Fast Boat Operational Time: 12 hours = 720 minutes

Traveling time: 2 hours = 120 minutes

With the operating time for ship departure starting at 08.00 am from the Lembar Ferries Port:

Early departure time = 08.00 am

Time of arrival = 2 hours

The time of departure = 00.00 in the morning

Then the ship's arrival time = 08.00 + 2 hours

= 10.00 WITA

2.1. Research Population and Sample Determination

The population in this study were all ferry passengers. The sample was carried out by simple random sampling of the passenger population of the ship so that it could represent passenger characteristics. Prof. Dr. Abuzar Asra, M.Sc. (Applied Statistics) the sample size is calculated based on the formula: (Nasution. (2008). Load factor or load factor is the number of passengers and vehicles carried by the ship compared to the capacity provided)

$$n = \frac{N}{1 + N \cdot e^2}$$

Where:

n: number of samples

N: population

e: error rate

2.2. Descriptive Analysis of Respondent Characteristics

The questionnaire data collection can be done to the ferry service respondents where in the last 5 years there was a significant increase. The characteristics of these service users can be analyzed in a way (https://opac.perpusnas.go.id/DetailOpac.aspx?id=918067 acessed on 17 October, 2020):

1. Age of Respondents/Service Users
2. Gender of Respondent/Service User
3. Job status
4. Income Level

5. Purpose of Travel
6. Desire level using Fast Boat

2.3. Ship Load Factor (Load Factor)

According to HMN. Nasution (1996) in his book transport management load factor is the number of passengers and vehicles carried by ship compared to the capacity provided (According to Edward K. Murlock (1984), basically the demand for transportation services is a reflection of the need for transportation from the use of this system, both for human transportation and for goods transportation).

The formula needed to determine the load factor for each ship is:

$$LF = \frac{KP}{KT} \times 100\%$$

Information:

LF = Load Factor

KP = Capacity Used

KT = Capacity Available

2.4. Forecasting Analysis of the Number of Fast Boat Passengers

For forecasting passenger productivity with various variables (Triadmodjo, Bambang Triadmodjo. Applied Statistics. p. 12), multiple linear regression analysis can be calculated by the formula:

$$Y = a + bX$$

Where:

Y = Bound Variable

A = Constant

B = Regression Coefficient

X = Independent Variable

2.5. Analysis of Forecasting Demand for Transportation Services

To predict the total demand for fast boats, the average method equation is used, namely:

$$Tij = tij. \left(\frac{Ei + Ej}{2} \right)$$

Where:

$Ei = \frac{Oi}{oi}$.

$Ej = \frac{Dj}{dj}$. Information:

Tij: Future movement from origin zone i to destination zone j

Tij: Future growth from origin zone I towards destination zone j

Ei, Ej: Zone i and zone j growth rate

Oi, Dj: Total future movements

oi, dj: Total movement of the present

2.6. Calculation Analysis of the Number of Ships Required

To determine the required fast boat frequency based on the number of passengers, you can use the formula (Nasution, 2008): (Ibid)

FP = $\frac{N}{365\ x\ K\ x\ O\ x\ M}$

Where:

FP = The frequency of ship departures for passengers (trip)

N = Number of Passengers going to use shuttles ferries in that year

K = Coefficient of ship operation time per year (generally 0.9)

O = Load factor planned 70% (0.7).

M = The capacity of the ship (passengers)

1. Headway

   Meanwhile, to determine the Headway the formula is used:

   Headway = $\frac{1}{F}$

   Where:

   H = Headway (hour/minute)

   F = frequency of the ship (trip/hour)

2. Round Trip Time (RTT)

   To calculate the ideal number of ships it can be calculated using the formula:

   Number of ships required = $\frac{RTT}{Headway}$

   RTT (Round Trip Time) is the length of the transportation trip back and forth from one point to another.

   RTT = (Running Time + Layover Time) x 2

Where:

Running Time: ship time at the docks

Layover Time: ship travel time

3. Results and Discussion

The Suranadi Express Fast Ship is a type of Jetty type fast boat that has a capacity of around 200 has a speed of 20 knots with a fast ship weight of about 56 tonnes capable of traveling the Lembar-Padangbai with time ± 2 hours. (Op.Cit) When the Suranadi express ship operates on the Lembar-Padangbai route, it only operates 10 trips/week. For the schedule of departure and arrival of the cross Lembar Fast Boat - padangbai

The Lembar Harbor and Padangbai Ferries connect Lombok Island and Bali Island. The Lembar-Padangbai has a distance of 36 miles and can be reached with a duration of 4 hours by using a ro-ro type of ferry and 2 hours by using a fast boat.

Figure 1: Map of Distance Trajectory of Lembar-Padangbai (*Source: PT. ASDP (Persero) Cabang Lembar*)

For Ferry Transportation Rates on ro-ro type vessels at Lembar Ferries Ports are as follows:

Meanwhile, the tariff setting for fast boats that have operated on the Lembar-Padangbai route are as follows:

3.1. Descriptive Analysis of Respondent Characteristics

Table 1: Ferry Vehicle and Passenger Fares at the Lembar Ferries port

NO	TYPES OF TICKETS	TOTAL RATES
I	**Passenger**	
1	Adult economy	40,000
2	Child economy	25,000
II	**Vehicle**	
1 2	Group I Group II	57,000 112,000
3	Group III	232,000
4	Group IV pnp	733,000
5	Group IV brg	687,000
6	Group V pnp	1,484,000
7	Group V brg	1,213,000
8	Group VI pnp	2,513,000
9	Group VI brg	2,001,000
10	Group VII	2,567,000
11	Group VIII	3,834,000
12	Group IX	5,741,000

Source: PT.ASDP (Persero) Lembar Branch

Table 2: Suranadi Express Fast Boat Fare Components Who Has Operated on the Cross Lembar-Padangbai

No.	Ticket Type	Total Fare
1	Executive	IDR 100,000, -
2	VIP	IDR 150,000

Source: PT. Suranadi Express

3.1.1. Lembar Ferries Ports

The questionnaire data collection can be done to the ferry service respondents after determining the sample by the author using the passenger productivity data. (Op.Cit)ro-ro at the Lembar Ferries Port where in the last 5 years there has been a significant increase. As for the characteristics of these service users, the authors analyze using descriptive analysis which includes analysis of characteristics of Respondent based on the results of descriptive analysis related to the age of the respondent at the Lembar Ferries Port, it can be seen that most of the respondents are in the age interval of 31-40 years, which is 33.97%, 62 % gender is male, 41 % profession is entrepreneur, 56% income age interval of 1 million to 5 million, purpose of travel 31 % is work, and 90 % agree to fast boat operation at the Lembar Ferries port.

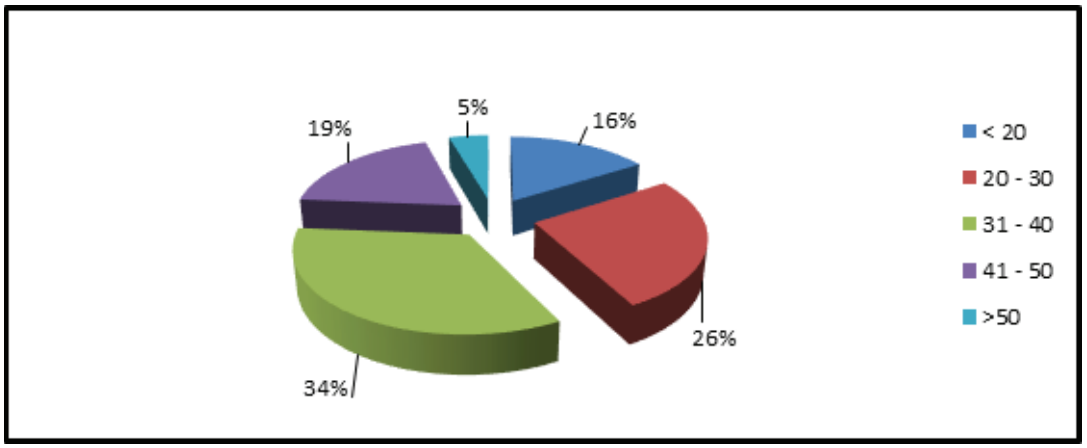

Figure 2: Percentage of Respondents Age at the Lembar Ferries port (*Source: Data Processed Results, 2014*)

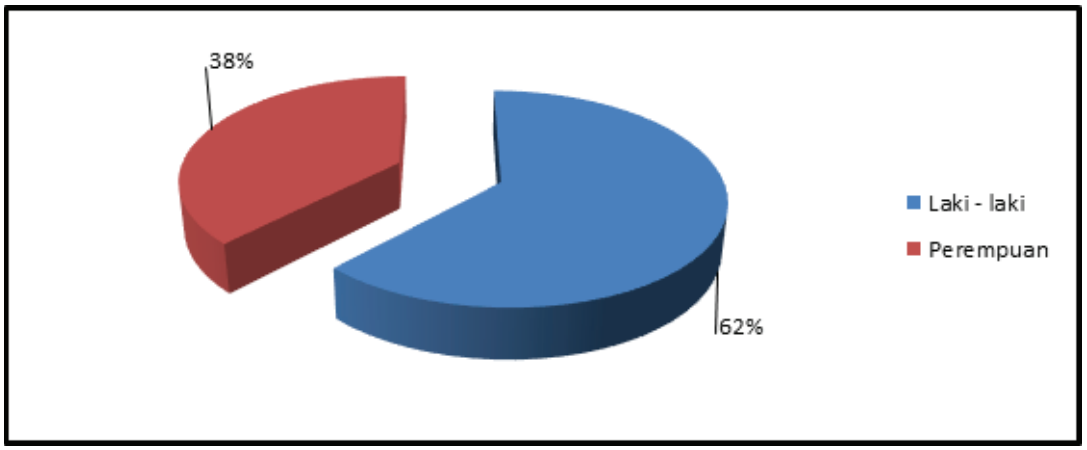

Figure 3: Percentage of Respondent Gender at the Lembar Ferries port (*Source: Data Processed Results, 2014*)

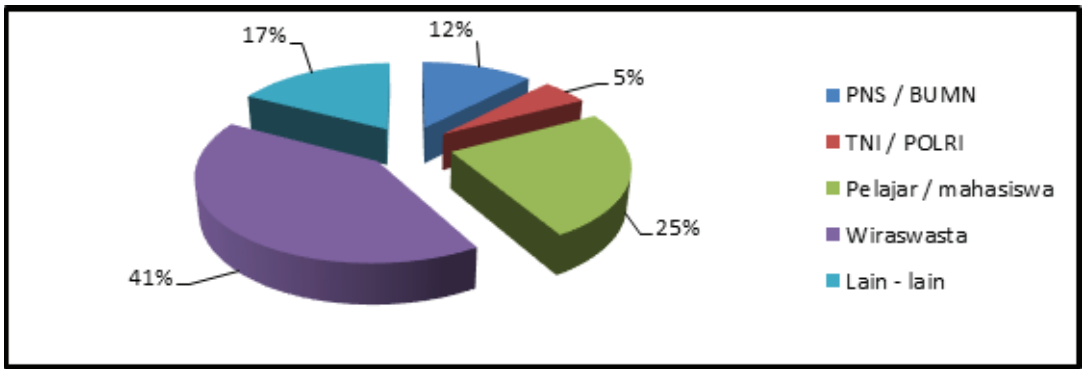

Figure 4: Percentage of Profession at the Lembar Ferries port (*Source: Data Processed Results, 2014*)

3.2. Population and Sample Determination

The sampling process is determined by the number of population with the nature of population limitations, based on this, the sampling is done by simple random sampling method. The sample size is calculated based on the sample estimate obtained from the

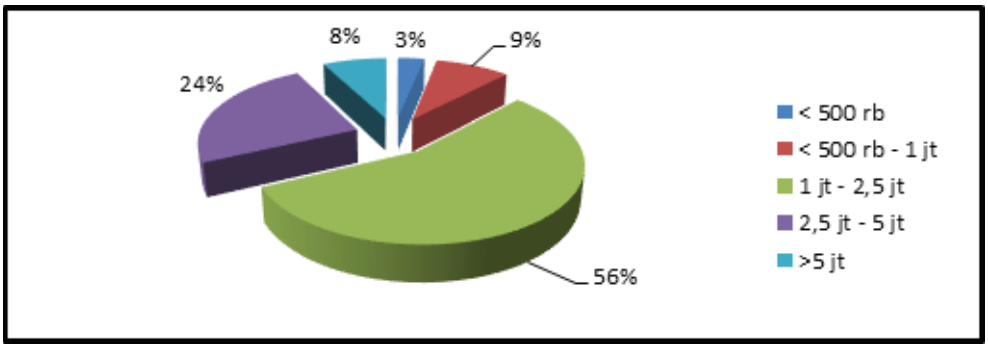

Figure 5: Percentage of Income at the Lembar Ferries port (*Source: Data Processed Results, 2014*)

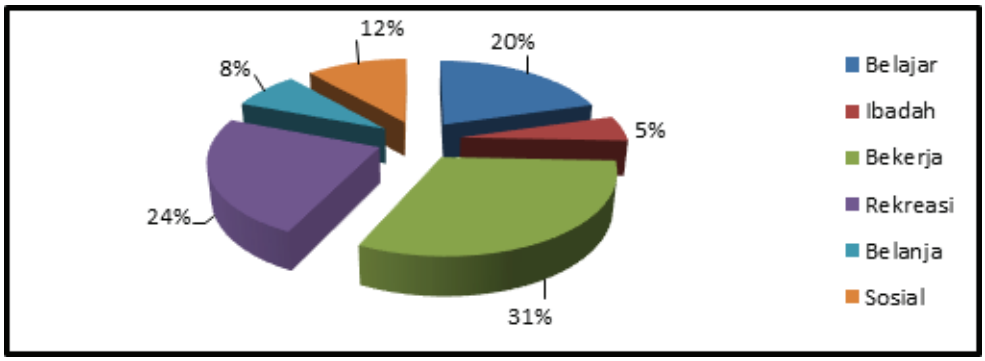

Figure 6: Percentage of Purpose of Travel at the Lembar Ferries port (Source: Data Processed Results, 2014)

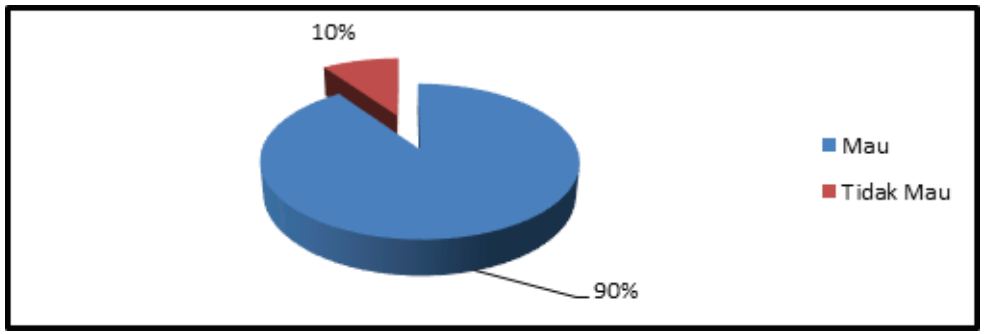

Figure 7: Percentage of Willing Level of Respondents In Fast Boat Operation at the Lembar Ferries port (Source: Data Processed Results, 2014)

ferry passenger population (HMN, Nasution. (1996). in his transportation management. p. 24) ro-ro types from the Lembar Ferries Port and Padangbai Ferry Port are as follows:

1. Lembar Ferries Ports

$$n=\frac{N}{1+N.e^2}$$

$$n=\frac{95.121}{1+95.121.(0,08^2)}$$

$$n=\frac{95.121}{609,7744}$$

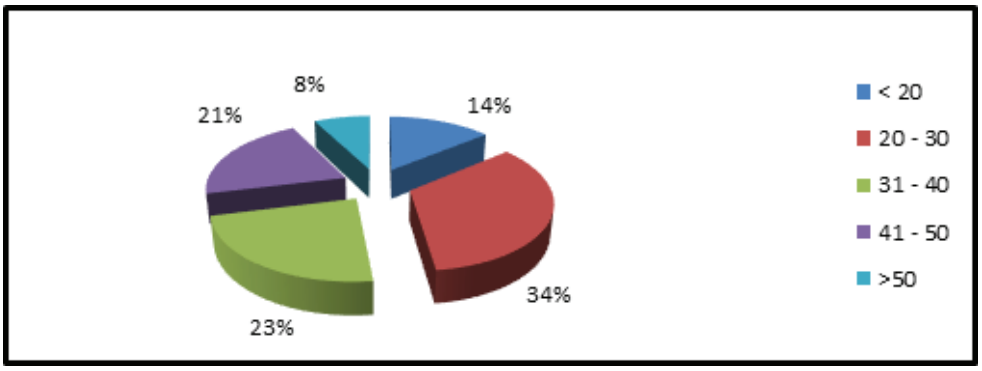

Figure 8: Percentage of Respondents' Age at the Padangbai Ferry Terminal (*Source: Data Processed Results, 2014*)

$$n=155,993\approx156$$

2. Padangbai Ferry Port

$$n=\frac{N}{1+N.e^2}$$

$$n=\frac{93.178}{1+93.178.(0,08^2)}$$

$$n=\frac{93.178}{597,3392}$$

$$n=155,988\approx156$$

The minimum sample size of the population at each Ferry Port is 156 with an error rate of 8%. For population data, it can be seen from productivity data. After analyzing the existing problems, efforts are made to serve service users at the Lembar-Padangbai are:

1. Re-operation of the Fast Boat Cross-Lembar-Padangbai for services to pedestrian service users.
2. The need for Fast Boat facilities in 2018 for the Lembar-Padangbai has increased to 2 (two) Fast Boats, because it exceeds the planned load factor by 70%. Load Factor with Passenger Movement at the Lembar Ferries Port of 126,036 people is 143.2%, while at the Padangbai Ferry Port it is 128.5%.
3. Arrangement of a well-structured schedule that is suitable for operational service hours of Fast Boat on Lembar-Padangbai. Within 1 (one) week the fast boat is planned to operate for 5 days and 2 days for anchoring.

Based on various considerations and the results of the author's analysis, then:

a. There is a need for transportation (demand), based on the results of the survey on the characteristics of respondents conducted by the author, that at the Lembar Ferries Port, the level of desire in operating the Fast Boat reaches 90%, while at the Padangbai Ferry Port, the level of desire in the Operation of Fast Boats is 85%. This is based on a sample taken based on the population growth of ro-ro ferry passengers.

b. Availability of Lembar Ferries Port and Padangbai Ferry Port which are used as plans for the operation of Fast Boat Facilities.

c. The increase in passenger growth in Cross Transportation Lembar-Padangbai services in the last 5 years (2009 - 2013) has made the fast boat alternative available to service users by prioritizing the level of safety, comfort, and timeliness considering service users want a fast and comfortable trip.

3.3. Suggestion

The suggestions that can be taken into consideration are:

1. To meet the large demand for Fast Boat facilities at the Lembar-Padangbai, 2 (two) Fast Boats are needed with the following criteria:
   (a) Fast Ship materials are made of Aluminum Alloy
   (b) Fast Boat Capacity 200 to meet Load Factor plans
   (c) Ship Speed 20 Knots From this data, the recommended Fast Ship has met the criteria for Ship Safety according to the International Maritime Organization (IMO) and Safety Of Life At Sea (SOLAS).
2. With the prediction of the need for fast boats at the Lembar-Padangbai until 2018, the number of requests for fast boat services is increasing every year. For excellent service, additional trips are needed on each fast boat that operates and a good schedule arrangement, especially during peak passenger hours.
3. For further planning, it is expected that fulfillment in terms of infrastructure to support the operational activities of fast boats at the Lembar-Padangbai, such as a special jetty type fast boat dock.
4. The Fast Ship Company and related agencies must provide evaluation and supervision of the business that will be carried out so that the ferries services using the Cross Lembar-Padangbai can be in accordance with the plan and can achieve the expected ideal conditions.

4. Conclusion

From the results of the analysis carried out at the Cross Lembar Ferries, recommendations that can be submitted are: Operation of Fast Boats at Lembar-Padangbai with initial steps based on forecasting passenger movements. From the results of the analysis carried out to predict the number of fast ships in 2018 with load factors; more than 70%, it takes 2 (two) Fast Boat facilities serving the Lembar-Padangbai ferries with the ability to only trip 4 trips/ship. Fast Boat operational time for 12 hours; Lembar-Padangbai can serve by using 1 (one) fast boat, by increasing the number of fast boat trips per day and reducing the headway time of fast boats and setting the fast boat operational schedule according to the needs of service users, especially during peak hours/passenger peak hours. By setting a regular schedule, it can make it easier for service users to determine the departure plan using the fast boat alternative at the Lembar-Padangbai.

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